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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/764,213	01/23/2004	Alexander A. Oraevsky	FMT-OA.01US	2189
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TIM L. BURGESS, P.C. 402 OAK LANE HOUSTON, TX 77024				
EXAMINER				
SHAHRESTANI, NASIR				
ART UNIT		PAPER NUMBER		
3737				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/764,213

Applicant(s)

ORAEVSKY ET AL.

Examiner

NASIR SHAHRESTANI

Art Unit

3737

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 January 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-60 is/are pending in the application.
- 4a) Of the above claim(s) 2-4, 17 and 33 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 5-16, 18-32 and 34-60 is/are rejected.
- 7) ☒ Claim(s) 22, 23, 58 and 59 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

This action is responsive to Applicant's communication filed 01/14/2008.

Claims 57-60 have been added as new.

Claims 2-4, 17, and 33 have been cancelled.

Claims 1-60 are pending.

Response to Arguments

Applicant's arguments filed 01/14/2008 have been fully considered but they are not persuasive.

The amendment filed 01/14/2008 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: "...directing onto said body specific radiation having a wavelength or spectrum of wavelengths in the range from **3 nm** to 300 nm selected so that the wavelength or wavelength spectrum is longer by a factor of at least 3 than the minimum characteristic dimension of said nanoparticulate...". Upon review of the applicants' disclosure and specification, examiner notes from figures 1, 6, and 10A that the applied radiation is in the range of 300nm to 300mm as originally disclosed. No support is given for a wavelength of 3nm.

Applicant is required to cancel the new matter in the reply to this Office Action.

On page 13 of the remarks, applicants state ..."claim 1 is amended to include a step of 'quantitatively characterizing said object(s) based on said assessment'"... however examiner is not able to find the proposed amendment within the current claimed language.

Examiner respectfully disagrees with applicants remarks stating that "...Henrichs et al. do not teach these at least partially metallic nanoparticulates..." as stated on page 17 of the remarks. The Henrichs et al. reference teaches metal oxide or heavy metal, and within the broadest reasonable interpretation of the claimed language, the Henrichs et al. particle is adequate to read on "at least partially metallic" as recited in the claim language, since the claimed language does not limit the nanoparticulate to be "...a solid nanoparticulate composed of a single metal or to a metal shell filled with another substance..." as described in applicants specification.

Regarding applicants remarks on page 17 stating "...the instant invention defines 'formed shape', in characterizing the nanoparticulates, as a shape that is fabricated or manipulated to increase one dimension more than the others in three dimensional space..." examiner respectfully maintains that this limitation of a "formed shape" is describing a non-spherical composition and hence the Link et al. reference was applied in the previous office action to cure the Henrichs et al. deficiency.

Examiner respectfully disagrees with applicants remarks on page 18 stating that "...The efficient generation of an optoacoustic signal depends on the conversion of the absorbed electromagnetic energy into heat, not back into light, i.e., luminescence or fluorescence..." and that "...The teaching that elongated gold nanoparticles are highly efficient as optoacoustic contrast agents, in spite of the significantly increased fluorescence shown by Link et al., is only

disclosed in applicants specification..." and that "...The combination of Henrichs et al. and Link et al. neither teaches nor suggests these advantages...".

The main point at hand, as described in the previous office action, even though also described by applicants' specification, is that Link et al. teach the use of non-spherical agents as an alternative to spherical ones with associated advantages, and hence the substitution of non-spherical rods would have been an obvious modification to the Henrichs et al. reference of record.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 5-16, 18-32, 34-53, and 60 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The added material which is not supported by the original disclosure is as follows: "...directing onto said body specific radiation having a wavelength or spectrum of wavelengths in the range from **3 nm** to 300 mm selected so that the wavelength or wavelength spectrum is longer by a factor of at least 3 than the minimum characteristic dimension of said nanoparticulate...". Upon review of the applicants disclosure and specification, examiner notes from figures 1, 6, and 10A that the applied radiation is in the range of 300nm to 300mm as originally disclosed. No support is given for a wavelength of 3nm.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-9, 54-56, and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Henrichs et al. (U.S. 6,662,040 B1) in view of Link et al. (NPL – “Shape and size dependence of radiative, non-radiative and photothermal properties of gold nanocrystals”).

Henrichs et al. teach a method of enhancing detection for a specific object in a body, Comprising the steps of:

a) administering to said body a nanoparticulate (col. 19 lines 55-64); the nanoparticulate being at least partially metallic (col. 25 line 45), which inherently has a formed composition capable of producing thermal pressure either in said nanoparticulate or in said object greater than said object could produce as a result of EM radiation in the absence of said nanoparticulate; and

b) directing onto said body specific EM radiation (col. 2 lines 3-9) having a wavelength or spectrum of wavelengths in the range from 300nm to 300mm (col. 8 lines 40-64), said nanoparticulate absorbing said EM radiation (abstract) and producing an enhanced optoacoustic signal resulting from said absorption (col. 1 lines 9-11).

Henrichs et al. do not specifically teach the use of a nanoparticulate formed in a non-spherical shape having a minimal characteristic dimension in the range from about 1 to about 3000 nanometers.

In the same field of endeavor, Link et al. teach a method of detection enhancement using optical absorption properties of metal nanoparticles having a non-spherical shape (fig. 1), having a mean aspect ration of 3.3 (pg. 413).

It would have been obvious to one of ordinary skill in the art at the time of invention to have modified the apparatus and method as taught by Henrichs et al. and to have incorporated gold nanorods as taught by Link et al. since the longitudinal plasmon resonance absorbing a t longer wavelength is more effective in amplifying the fluorescence intensity in gold nanoparticles than the surface plasmon resonance of spheres, which could be due to the fact that longitudinal plasmon resonance is less damped and has a much larger oscillator strength (Link et al., pg. 423).

Henrichs et al. further teach detecting pressure waves generated in said body by said radiation and generating an optoacoustic image (abstract), and that in order to generate an image, the optoacoustic signal is inherently converted into an electrical signal. Henrichs et al. further teach wherein the interaction of said nanoparticulate with said object produces a shift of the absorption maximum by said nanoparticulate for said selected wavelength or range of wavelengths (col. 9 lines 66-67 – col. 10 lines 1-16). Henrichs et al. further teach wherein said wavelengths are in the visible and near infrared spectrum (col. 4 lines 19-30).

Claims 10-16, 18-32, 34-53, 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Henrichs et al. (U.S. 6,662,040 B1) in view of Link et al. (NPL – “Shape and size dependence of radiative, non-radiative and photothermal properties of gold nanocrystals”) and in further view of Oldenburg et al. (U.S. 6,344,272 B1).

Henrichs et al. in view of Link et al. teach all the limitations of claim 6 but do not specifically teach said nanoparticles are combinations of nanoparticles of one shape and nanoparticles of another shape made of various mixtures.

Oldenburg et al. teach a method of photoacoustic imaging using metal nanoshells comprising the use particles that are mixtures being homogenous or non-homogenous in size and are comprised of a nonconducting inner layer that is surrounded by an electrically conducting material (abstract). The aggregate is comprised of spherical nanoparticles (fig. 1), in which said nanoparticle are at least partially coated with organic material, such organic material comprising genetic material or selected from gold, silver, platinum, a form of carbon having metallic properties, a mixture of at least two of said metals, or an alloy of at least two of said metals (col. 5 lines 66-67 – col. 6 lines 1-9). Oldenburg et al. further teach various probable sizes of diameters being solid (col. 5 lines 40-65), and that the absorbance maximums are insensitive to changes in particle size and various dielectric coatings on the particles (col. 1 lines 61-64). Oldenburg et al. further teach wherein said organic material is ambiphilic (col. 10 lines 50-58) and that the specially tailored particles or particle mixtures can be added to various polymers during preparation by methods well known in the art including polyethelyne, PVA, etc. (col. 4 lines 39-43) and/or carboxylic acid linkages (col. 12 lines 31-33).

It would have been obvious to one of ordinary skill in the art at the time of invention to have modified the apparatus and method as taught by Henrichs et al. in view of Link et al. and to have incorporated the teachings of Oldenburg et al. to provide more efficient response following EM radiation and longer survival time of the nanoparticle.

Henrichs et al. further teach wherein said wavelengths are in the visible and near infrared spectrum (col. 4 lines 19-30).

Allowable Subject Matter

Claims 22-23 and 58-59 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The prior art of record does not teach or suggest the specific thermal expansion range of the nanoparticle core, nor do they teach the use of bio-warfare agents, and a carbon nanotube.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NASIR SHAHRESTANI whose telephone number is (571)270-1031. The examiner can normally be reached on Mon.-Thurs: 7:30-5:00, 2nd Friday: 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Casler can be reached on 571-272-4956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Brian L Casler/
Supervisory Patent Examiner, Art Unit
3737

/N. S./
Examiner, Art Unit 3737

Application Number**Application/Control No.**

10/764,213

**Applicant(s)/Patent under
Reexamination**

ORAEVSKY ET AL.

Examiner

NASIR SHAHRESTANI

Art Unit

3737